#502

SKYLAB
SKYLAB S-019 FAR-UV
DATA (1979)
73-027A-02B

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SKYLAB S-019 FAR-UV

DATA (1979)

73-027A-02B

This data set catalog consists of one magnetic tape. The tape is 9-track, 1600 BPI, ASCII with one file of data, and was created on the 3081 computer. The D and C numbers follow below.

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ASTRONOMICAL DATA CENTER

DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE CATALOGUE OF FAR-ULTRAVIOLET OBJECTIVE-PRISM SPECTROPHOTOMETRY: SKYLAB EXPERIMENT S-019, ULTRAVIOLET STELLAR ASTRONOMY

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DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE CATALOGUE OF FAR-ULTRAVIOLET OBJECTIVE-PRISM SPECTROPHOTOMETRY: SKYLAB EXPERIMENT S-019, ULTRAVIOLET STELLAR ASTRONOMY

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SECTION 1 - INTRODUCTION

A COPY OF THIS DOCUMENT SHOULD ACCOMPANY EVERY DISTRIBUTED COPY OF THE MACHINE-READABLE CATALOGUE.

This document describes a machine-readable version of the Catalogue of Far-Ultraviolet Objective-Prism Spectrophotometry: Skylab Experiment S-019 (Henize et al. 1979). It contains arrays of ultraviolet flux measurements at wavelengths of 1300 to 4200 A. The data were obtained with an objective-prism telescope (an f/3 Ritchey-Chretien system with a 15-cm aperture and a calcium fluoride-lithium fluoride focal-plane corrector). The spectra were digitized with a PDS 1010A microdensitometer, and each spectrum was scanned in a series of strips 30 microns wide apiece.

This catalogue contains data on 494 stars. The data on each star are quite complex and include a number of parameters besides the adopted fluxes. Near the beginning of Table 2-1 below is a description of the structure of the data on each star, and the user is urged to read this description carefully before trying to use the catalogue. The considerations that led to the adopted catalogue format are described in Section 4 below.

Those parts of the text of this document that are enclosed in quotation marks have been taken verbatim from Henize et al. (1979) for clarity.

REFERENCES:

Follow Section 4.

SECTION 2 - TAPE CONTENTS

A byte-by-byte description of the catalogue is given in Table 2-1 and Table 2-2. The information in the "Description" colum is derived from the published catalogue as much as possible. The "Suggested Format" column is for Fortran formatted reads.

In Table 2-1, bytes can be numbered in two different ways: by position within a logical record, denoted by unsigned integers starting at 1; or by position within a field, denoted by signed integers, starting at +0. The first kind of number is called a byte number, and the second kind is called a byte offset, or just offset.

Offsets are used to describe field formats that are repeated many times in the record. Byte numbers are given (or can be computed) for the first byte of each instance of the field; then the byte numbers of the data within a particular field can be found by adding the offsets to that starting byte number.

Table 2-1. Tape Contents, Data File (1 of 9)
Far-Ultraviolet Objective-Prism Spectrophotometry
Skylab Experiment S-019

BYTES	DESCRIPTION	SUGGESTED FORMAT
1-10	Henry Draper Catalogue (HD) number of the star. Table 4-1 below is a list of all the stars in this file.	10A1
11-20	Alternative name of the star. When no alternative name is given, these bytes are the same as bytes 1-10.	10A1

Each record in this file is 5354 bytes long and contains the data for one star. There are 494 stars, and thus, 494 records. The user must be aware of the general character of the record format before proceeding to the rest of Table 2-1.

The data in each record fall mainly into two categories: exposure data and flux data. Every record can contain data on as many as five different exposures, and data on as many as 514 different fluxes. Each exposure-data field is in one format, and each flux-data field is in another format. Thus, the format of each whole record consists, for the most part, of two series of repeated field types: one five-element series and one 514-element series.

The five exposure-data fields are contained in bytes 21-205, each field being 37 bytes long. The 514 flux-data fields are contained in bytes 214-5353, each field being 10 bytes long.

The series of flux-data fields falls into five sub-series, four of which correspond to constant wavelength intervals over which the fluxes are averaged. The fifth sub-series contains intermediate-band magnitudes averaged over intervals of varying width. In each of the five sub-series, a given wavelength interval is mapped into a certain location in the record, and this mapping is the same for the whole file. Not every sub-series is complete for every star, so that many flux fields are blank.

21-205 Exposure data. These data are contained in five fields of 37 bytes apiece. For most stars, fewer than five exposures were used. In this case, the exposure-data fields are filled from left to right, and the fields not used contain blanks.

21	-	57	Data on first exposure.
58	-	94	Data on second exposure, or blank.
95	-	131	Data on third exposure, or blank.
132	-	168	Data on fourth exposure, or blank.
169	-	205	Data on fifth exposure, or blank.

Table 2-1. Tape Contents, Data File (2 of 9)
Far-Ultraviolet Objective-Prism Spectrophotometry
Skylab Experiment S-019

BYTES	DESCRIPTION	SUGGESTED FORMAT
The exposure field format in terms of byte offsets (see page 2-1) is as follows:		
+0 to +6	Plate number. Information on each frame taken throughout the experiment can be found in the second file of this catalogue by keying on this plate number. See below Table 2-2, bytes 1-7.	7A1
+7	Blank.	1X
+8 to +10	Exposure time in seconds. If no precise time was available (because of gaps in the observing log), a reasonable default value is used.	I3
+11	':' if a default value is used for the exposure time in offsets +8 to +10, otherwise blank.	A1
+12	Blank.	1X
+13 to +23	Position of the star on the plate in millimeters (mm):	
	"The plate position ... refers to the position of the optical head of the spectrum with respect to the field center, measured at the original plate scale. Coordinates are defined such that, with the frame oriented [with] shorter wavelengths toward the left, X increases toward the left and Y increases toward the bottom. The dimensions of the 4° by 5° field are 32 mm by 40 mm on this scale."	
	NOTE: At this writing, prints of the S-019 frames can be obtained from the National Space Science Data Center as described in Section 4 below.	
	+13 to +17 X (mm).	F5.1
	+18 Blank.	1X
	+19 to +23 Y (mm).	F5.1

Table 2-1. Tape Contents, Data File (3 of 9)
Far-Ultraviolet Objective-Prism Spectrophotometry
Skylab Experiment S-019

BYTES		DESCRIPTION	SUGGESTED FORMAT
	+24	Blank.	1X
	+25 to +26	Number of microdensitometer scans of the stellar spectrum. Each scan is a longitudinal strip 30 microns (μm) wide; thus multiplying by 30 μm gives the approximate width of the spectrum. The portions that overlap with other stars are not included.	I2
	+27	Blank.	1X
	+28 to +30	The weight of the spectrum. "The assigned weight ... for each spectrum depends partly on the measureable width and partly on the presumed quality of the reduction. The [Skylab mission] SL4 spectra normally receive a weight of 0.6 or 0.7, instead of 0.9 or 1.0, because the emulsion batch used was grainier and had poorer photometric properties than the batch used on SL2 and SL3."	F3.1
	+31	Blank.	1X
	+32 to +35	Scale value, which is "the relative scaling of the flux values for maximum agreement prior to averaging the different exposures. It also was used to make an approximate adjustment when less than the full width of the spectrum could be scanned."	F4.2
	+36	Blank.	1X
206-213	Flux adjustment factor for the star.		
	206	First part of comment notation. Can be "(", "<", or blank. See bytes 211-213.	A1
		The comment notation, which describes different cases and methods for the flux-adjustment calculation, is in bytes 206 and 211-213 in the same form as in the published catalogue. A full explanation of this notation is given in Section 4 below.	

Table 2-1. Tape Contents, Data File (4 of 9)
Far-Ultraviolet Objective-Prism Spectrophotometry
Skylab Experiment S-019

BYTES	DESCRIPTION	SUGGESTED FORMAT
207 - 210	Flux adjustment factor r, defined by this formula: (absolute flux) = (S-019 flux)*r "The absolute flux levels for most stars were compared with other satellite measurements or with predicted fluxes to assess the accuracy of the calibration and to provide the user with adjustment factors."	F4.2
211 - 213	The second part of the comment notation, or else blank. The notations in this field consist of one or more of ")", ">", ":", "::", and "+-". See also byte 206.	3A1
214 - 5213	Flux data. Each flux is in a 10-byte field which contains all the information in the published catalogue except the wavelength. The wavelength is determined by the bytes in which the field appears. Note that floating-point (F format) data have implicit decimal points.	

The correspondence between wavelength and byte is determined by the following table, in which $\Delta\lambda$ is the bandwidth, MIN is the minimum of the possible wavelengths in angstroms (A) for that bandwidth, MAX is the maximum of the possible wavelengths in A for that bandwidth, and BASE is the first byte of the ten-byte field corresponding to MIN. The values MAX are redundant for determining the correspondence, but are given for clarity. COUNT is the greatest number of fluxes that can be given for each bandwidth; i.e., the number of ten-byte fields in that part of the record.

Table 2-1(a). Constants for Determining Wavelength and Bandwidth from Byte Position.

$\Delta\lambda$ (A)	BASE (BYTE)	MIN (A)	MAX (A)	COUNT
2	214	1310	1828	260
5	2814	1800	2320	105
10	3864	2300	3040	75
20	4614	3000	4180	60

Table 2-1. Tape Contents, Data File (5 of 9)
Far-Ultraviolet Objective-Prism Spectrophotometry
Skylab Experiment S-019

BYTES	DESCRIPTION	SUGGESTED FORMAT
	The wavelengths appear in ascending order starting at the given base bytes, each successive 10-byte field representing an increment by the bandwidth. Thus, the following formula converts a byte number (BYTNUM) to the corresponding wavelength (λ): $\lambda = \lfloor (BYTNUM-BASE)/10 \rfloor * \Delta\lambda + MIN$	
	The following is a description of the flux field format in terms of byte offsets:	
+0	Comment character—either a blank or one of the following: U - underexposure; the average intensity is only a little above the background fog E - extreme exposure; the average intensity is not far from saturation L - overlapping star D - plate defect	A1
+1 to +4	Flux measurement. Approximately the absolute flux incident at the earth, averaged over the range $\lambda - \Delta\lambda/2$ to $\lambda + \Delta\lambda/2$, where $\Delta\lambda$ has one of the values in Table 2-1(a), and where λ is related to the absolute position of the field in the record by the formula given after Table 2-1(a). This value is given in modified exponential notation, with two values D (digits) and C (order-of-magnitude code), such that $flux = D * 10^{-C-8}$ ergs cm^{-2} sec^{-1} A^{-1} The flux is a weighted average of the data points for the wavelength from all the exposures. Each individual weight is a function of the slope of the characteristic curve of the emulsion at the density of the particular wavelength (which can vary from exposure to exposure), with the straight-line portion weighted at 1.0.	

Table 2-1. Tape Contents, Data File (6 of 9)
Far-Ultraviolet Objective-Prism Spectrophotometry
Skylab Experiment S-019

BYTES	DESCRIPTION		SUGGESTED FORMAT
	There are eight dummy data points in the catalogue, and in the published version these are represented by flux values on the order of 10^{-24}. These instances are listed in Table 4-2 of this document and are represented by all-blank flux fields in the machine-readable version.		
	+ 1 to + 3	Digits (D) of flux measurement, as in the above formula.	I3
	+4	Order-of-magnitude code (C) of flux measurement, as in the above formula.	I1
+5 to +6	Total weight of the wavelength. This number is calculated from weights contributed by the individual spectra. It refers mainly to the accuracy of the absolute fluxes, rather than to spectral details. It also reflects the general reliability of the data in the region, as indicated by the comment character at offset +0. The weights of the component spectra are described under offsets +1 to +4.		F2.1
+7 to +9	Standard deviation, according to the following formula, as a percentage of the average flux given at offsets +1 to +4: σ = the standard deviation N = the number of spectra averaged w_i = the weight of an individual spectrum as described under offsets +1 to +4 S_i = the scale factor for the exposure, given in offsets +22 to +25 of each exposure-data field (see bytes 21-205 above) F_i = the flux in an individual spectrum F = the average flux as given in offsets +1 to +4		F3.1

Table 2-1. Tape Contents, Data File (7 of 9)
Far-Ultraviolet Objective-Prism Spectrophotometry
Skylab Experiment S-019

BYTES	DESCRIPTION	SUGGESTED FORMAT
	$$\sigma^2 = \sum_1^N w_i \left(S_i F_i - F \right)^2 / \sum_1^N w_i$$ The standard deviations "reflect both grain noise and the effects of differences in slope among the derived energy distributions." A long series of zero standard deviations means that only one exposure was used in that region.	
5214-5353	Intermediate-band magnitudes. These are computed over comparatively wide wavelength intervals and are related to the fluxes by $$MAG = -2.5 * \log F - 21.10$$ where F is the average flux over the interval. The constant, corresponding to $$3.64 \times 10^{-9} \text{ergs cm}^{-2}\text{sec}^{-1}\text{A}^{-1}$$ was adopted in accordance with Nandy et al. (1976), "in order to put the magnitudes on the same energy scale as visual V magnitudes. The value of F is a straight average (rectangular passband), except for the 360 nanometer (nm) band, where a Johnson U filter function is used (Mathews and Sandage 1963). Based on the absolute calibration of U magnitudes (Johnson 1966), approximately 0.20 magnitude should be subtracted to put the ground-based U values on the same energy scale." In this magnitude system, the width of each passband on the film is a constant 360μm. The intermediate-band magnitudes are in ten-byte fields of the same form as the flux fields above, with differences which will be explained below. The following table shows the starting byte of each intermediate-band magnitude field:	

Table 2-1. Tape Contents, Data File (8 of 9)
Far-Ultraviolet Objective-Prism Spectrophotometry
Skylab Experiment S-019

BYTES	DESCRIPTION	SUGGESTED FORMAT

Table 2-1(b). Intermediate-Width Passbands.

FIRST BYTE	CENTRAL λ (nm)	RANGE (A)	FEATURES
5214	135	1347 - 1364	Continuum.
5224	139	1385 - 1405	SiIV lines.
5234	148	1465 - 1495	Continuum.
5244	154	1521 - 1560	C IV plus FeIII plus SiII lines.
5254	161	1587 - 1636	Temperature- and gravity-sensitive blends.
5264	166	1636 - 1693	Continuum; blends in hotter stars.
5274	172	1693 - 1760	Gravity-sensitive blend.
5284	181	1770 - 1853	Continuum.
5294	192	1870 - 1975	Gravity-sensitive depression (FeIII).
5304	204	1975 - 2110	Continuum.
5314	219	2110 - 2290	Continuum; maximum interstellar extinction.
5324	245	2320 - 2600	Continuum; FeII in cooler stars.
5334	280	2600 - 3070	Continuum; MgII in cooler stars.
5344	360	3070 - 4100	Continuum; approximate Johnson U magnitude

Following is a description of the field format of the intermediate-band magnitudes according to byte offsets.

+0	Comment character. See offset +0 under bytes 214-5213 above.	A1
+1 to +3	Magnitude as described above, with a decimal point implicit between offsets +1 and +2.	F3.2
+4	Not used.	1X
+5 to +6	Total weight for the passband. See offsets +5 to +6 under bytes 214-5213 above.	F2.1

Table 2-1. Tape Contents, Data File (9 of 9)
Far-Ultraviolet Objective-Prism Spectrophotometry
Skylab Experiment S-019

BYTES		DESCRIPTION	SUGGESTED FORMAT
	+7 to +9	Standard deviation. See offsets +7 to +9 under bytes 214-5213 above. This standard deviation is to be interpreted slightly differently from those in bytes 214-5213: this value is "computed from the differences among the magnitudes from separate exposures, hence the grain noise component is eliminated."	F3.1
5354	Blank.		1X

Table 2-2. Tape Contents (1 of 4)
Exposure Data for Skylab Experiment S-019

BYTES	DESCRIPTION	SUGGESTED FORMAT
1-7	Frame number. Each exposure has a unique identifier which is referred to in the data file (see Table 2-1, bytes 21-205). Each exposure number, also called a frame number, consists of a mission number (SL2, SL3, or SL4), and an integer exposure sequence number.	7A1
8	Blank.	1X
9-21	Field center. "The celestial orientation of Skylab was often uncertain by 1° or more, so all field centers were determined with the Becvar atlases (Becvar 1962, 1964). On the prism exposures, the highly compressed optical end (head) of the spectrum, ending near 5000 A, was used for positional reference." This field is blank if the frame was for calibration or was unusable because of defects, fogging, bad exposure, etc.	
	9 "(" if the field center is uncertain, otherwise blank.	A1
	10-14 Right ascension (1950) of field center.	
	10-11 Hours of right ascension.	I2
	12 ":" (colon).	A1
	13-14 Minutes of right ascension.	I2
	15 Blank.	1X
	16-20 Declination (1950) of field center in degrees.	F5.1
	21 ")" if the field center is uncertain, otherwise blank.	A1
22	Blank.	1X
23-27	Field designation. Five-character designation for internal use by the S-019 investigators.	5A1
28	Blank.	1X
29-34	Calendar date of exposure.	
	29-30 Year.	I2
	31-32 Month.	I2
	33-34 Day.	I2

Table 2-2. Tape Contents (2 of 4)
Exposure Data for Skylab Experiment S-019

BYTES	DESCRIPTION	SUGGESTED FORMAT
35-36	Blank.	2X
37-48	Universal Time (UT) for the start of each exposure. Bytes 37-48 are blank for calibration exposures. "Start and end times could be determined to the nearest second from verbal 'marks' given by the astronaut and recorded on two-track tape, the second track containing a time signal. [Approximately 25 percent of] this information is lost, in which case the start time is given to the nearest minute and should be within 2 minutes of the actual start of the observation."	
	37-39 Day of year following January 0.0.	I3
	40 ":" (colon).	A1
	41-42 UT of exposure, hours	I2
	43 ":" (colon).	A1
	44-45 UT of exposure, minutes	I2
	46 ":", or blank if the exact start time was lost (see explanation of bytes 37-48).	A1
	47-48 UT of exposure, seconds; or blank if the exact start time was lost (see explanation of bytes 37-48).	I2
49-50	Blank.	2X
51-53	Serial number of the film canister.	I3
54-55	Blank.	2X
56-59	Tilt angle, which refers to the Articulated Mirror System (Henize et al. 1979). At 0° tilt, the line of sight makes a 30° angle with the spacecraft wall.	F4.2
	Bytes 56-77 are blank for calibration exposures.	
60-61	Blank.	2X
62-64	Position angle, defining the orientation of north on the frame. With the print oriented so that shorter wavelengths are toward the left, the zero point of position angle is toward the top. The angle is measured clockwise in degrees.	I3

Table 2-2. Tape Contents (3 of 4)
Exposure Data for Skylab Experiment S-019

BYTES	DESCRIPTION	SUGGESTED FORMAT
65-66	Blank.	2X
67-69	The planned, nominal exposure time in seconds.	I3
70	Blank, or comment character: U = unwidened spectra N = no prism, direct photograph	A1
71	Blank.	1X
72	"(" if the actual exposure time is uncertain, otherwise blank.	A1
73-75	Actual measured exposure time when determinable from the voice marks (see bytes 37-48).	I3
76	")" if the actual exposure time is uncertain, otherwise blank.	A1
77	Blank.	1X
78-100	Remarks. Two exposures have extremely long remarks which are not included in the machine-readable version and are as follows:	23A1

RECORD NO.	FRAME	REMARK
377	SL4-050	Started before comet rise, total 253 sec.
417	SL4-090	Resembles very short U expo. According to transcript, it may have been terminated after 10 sec., <- 219.

Table 2-2. Tape Contents (4 of 4)
Exposure Data for Skylab Experiment S-019

BYTES	DESCRIPTION	SUGGESTED FORMAT

The following are the explanations given by Heinze et al. (1979) for abbreviations appearing in the remarks:

REMARK	MEANING
ATM.EXT	Indicates spectra are affected by atmospheric extinction.
END:	Gives end time of exposure to nearest second when known, if start time was not recorded.
(FOGGED)	Indicates plate has narrow streak of fog, or general fog greater than normal.
FOGGED	Indicates plate has heavy fog, but images may be usable.
HIFOG	Indicates plate has severe fog, images not usable.
NO IMD	Indicates the spectra are trailed due to failure to inhibit momentum dumping.
<-	Indicates field was renumbered from the pad designation.
->	Indicates this field now shared between two adjacent fields.

SECTION 3 - TAPE CHARACTERISTICS

The information contained in this section describes the format of the catalogue as a whole, while Section 2 describes the format of the individual records. Multiple entries in the table refer to the respective files of a multiple-file catalogue. Besides the information given here, the user will need to know other attributes which depend on the specific operating system and hardware for which the catalogue tape has been generated. The names of these attributes are listed.

Table 3-1. Tape Characteristics

Catalogue of Far-Ultraviolet Objective-Prism Spectrophotometry:
Objective-Prism Spectrophotometry: Skylab Experiment S-019,
Ultraviolet Stellar Astronomy

Catalogue Abbreviation	S019
Number of Files	2
Logical Record Length (Bytes)	5354 and 100
Record Format (IBM JCL)	FB
Total Number of Logical Records	494 and 469

The other attributes of the tape will vary from copy to copy. They have been supplied to you separately, as they depend on the system for which the tape was made. The following space is provided for you to write them into this document.

Number of Tracks
Density (Bits per Inch)
Block Size (Bytes)
Blocking Factor** (Number of Logical Records per Block)
Total Number of Blocks
Character Code (BCD, ASCII, or EBCDIC)

** Note: The blocking factor is a fixed quantity for record format FB (fixed-block) files only. Even in FB files, the last block may be truncated.

SECTION 4 - REMARKS AND MODIFICATIONS

The S-019 catalogue was received from S. Parsons by the Astronomical Data Center (ADC), NASA Goddard Flight Center, on several tapes in 1979. The treatment of the exposure data file was straightforward, and will not be discussed here.

The spectrophotometric data was received in five files formatted for direct dumping to a printer to produce the catalogue as originally printed. The format has been radically changed. The data for each star have been put into a single record. In order to shorten the records to the degree possible, the flux data format has been condensed, mostly through the implicit representation of wavelength by the location of each datum in the record. No data have been changed or edited in regard to their content.

The format was designed in order to simplify the structure of any Fortran program that would use the data by making it possible for one Fortran READ statement to store in variables all of the required data for any given star. An example of Fortran code to accomplish this task is given in Section 6.

Prints of the S-019 fields can be obtained from the National Space Science Data Center. Address queries to the NSSDC, Manager, Request Coordination, Goddard Space Flight Center, Code 601, Greenbelt, MD 20771.

FLUX ADJUSTMENT FACTOR

This section describes the flux adjustment factor given in the first file (see Table 2-1, bytes 206-213). This explanation is partly quoted and partly paraphrased from the published catalogue.

"The [flux adjustment] factor is determined by comparison at selected wavelengths between S-019 fluxes resulting from the adopted calibration and one of the following:

(a) The flux measured by the S2/68 spectrometer on the TD-1 satellite (Jamar et al. 1976; Willis and Wilson 1978).

(b) The flux measured by the WEP spectrometer on OAO-2 (Code and Meade 1976), but adjusted by as much as 25 percent to agree with TD-1 fluxes on the average.

(c) The flux computed from (i) intrinsic UV colors derived from TD-1 fluxes as a function of spectral type (Nandy et al. 1976), from (ii) the visual magnitude, and from (iii) interstellar extinction corrections using E(B-V) defined by the Q method from UBV photometry (Johnson 1958).

(d) The flux from model atmospheres (Kurucz et al. 1974) and from visual magnitude."

Table 4-1 lists the notation in the machine-readable version of the catalogue for the above cases. See also Table 2-1, bytes 206-213.

Table 4-1. Flux Adjustment Factor Notation.

r is the flux adjustment factor given in bytes 207-210 of the data file (see Table 2-1). The associated notations, described in this table, are given in bytes 206 and 211-213. Cases (a) - (d) mentioned in this table refer to the description quoted in this section.

NOTATION	DESCRIPTION
r:	Adjustment factor determined for case (c). This method is restricted to spectral classes earlier than A0.
(r)	Adjustment factor determined for case (d). Used for stars in spectral classes A0 - A7 not measured by TD-1 or OAO-2.
r+-	Denotes a significant slope in the residual leading to a range on the order of 0.2 to 0.3 dex from the shortest to the longest wavelengths. A weighted mean r value is given.
<r>	The r value is predicted from appropriate shifts dependent on frame number and plate position for stars for which the r value could not be determined directly. See Henize et al. (1979), pp. 30-31, for more details.
r::	Adjustment factor determined for cases (c) and (d) when there is uncertainty about the appropriate intrinsic colors. The estimated color and predicted log r were averaged to obtain the final r value presented in the catalogue.

Table 4-2. Dummy Data Points.

This table refers to bytes 214 - 5213, offsets +1 to +4, in Table 2-1 above.

FILE 1 RECORD NO.	STAR	λ(A)	NOMINAL FLUX (ergs cm^{-2} s^{-1} A^{-1})
147	HD 55879	1384	1.23×10^{-24}
		1398	1.23×10^{-24}
		1402	1.23×10^{-24}
		1404	1.23×10^{-24}
171	HD 58978	1394	9.89×10^{-25}
		1404	9.89×10^{-25}
207	HD 69106	1550	1.50×10^{-24}
		1552	1.50×10^{-24}

Table 4-3. List of S-019 Stars. (1 of 4)

RECORD NUMBER	HD NUMBER	ALTERNATE NAME	RECORD NUMBER	HD NUMBER	ALTERNATE NAME
1	HD 358	ALF AND	71	HD 33948	HR 1704
2	HD 432	BET CAS	72	HD 34029	ALF AUR
3	HD 593	HD 593	73	HD 34085	BET ORI
4	HD 1337	20 CAS	74	HD 34503	TAU ORI
5	HD 1976	HR 91	75	HD 34816	LAM LEP
6	HD 2054	HR 96	76	HD 35007	HR 1764
7	HD 2772	LAM CAS	77	HD 35039	22 ORI
8	HD 2905	KAP CAS	78	HD 35149	23 ORI
9	HD 3240	HR 144	79	HD 35299	HR 1781
10	HD 3360	ZET CAS	80	HD 35337	8 LEP
11	HD 4142	HR 189	81	HD 35439	25 ORI
12	HD 4180	OMI CAS	82	HD 35468	GAM ORI
13	HD 5394	GAM CAS	83	HD 35575	HD 35575
14	HD 5406	HR 266	84	HD 35588	HR 1803
15	HD 10144	ALF ERI	85	HD 35708	114 TAU
16	HD 10516	PHI PER	86	HD 35715	PSI ORI
17	HD 16349	HD 16349	87	HD 35912	HR 1820
18	HD 18925	GAM PER	88	HD 36267	32 ORI
19	HD 19268	HR 930	89	HD 36285	HR 1840
20	HD 19356	BET PER	90	HD 36351	33 ORI
21	HD 20191	HD 20191	91	HD 36430	HR 1848
22	HD 20263	HR 979	92	HD 36456	IEL ORI
23	HD 20677	32 PER	93	HD 36486	DEL ORI
24	HD 20809	HR 1011	94	HD 36512	UPS ORI
25	HD 20902	ALF PER	95	HD 36591	HR 1861
26	HD 21364	XI TAU	96	HD 36695	VV ORI
27	HD 21428	34 PER	97	HD 36779	HR 1873
28	HD 21551	HR 1051	98	HD 36822	PHI-1 ORI
29	HD 21686	4 TAU	99	HD 36827	HD 36827
30	HD 21699	HR 1063	100	HD 36861	LAM ORI
31	HD 21856	HR 1074	101	HD 36895	HD 36895
32	HD 21933	6 TAU	102	HD 36960	HR 1887+80
33	HD 22192	PSI PER	103	HD 37041	THI-2 ORI
34	HD 22780	HR 1113	104	HD 37043	IOT ORI
35	HD 22928	DEL PER	105	HD 37128	EPS ORI
36	HD 22951	40 PER	106	HD 37150	HR 1906
37	HD 23193	HR 1133	107	HD 37202	ZET TAU
38	HD 23302	17 TAU	108	HD 37209	HR 1911
39	HD 23630	ETA TAU	109	HD 37269	26 AUR
40	HD 23753	HR 1172	110	HD 37303	HR 1918
41	HD 23848	42 PER	111	HD 37468	SIG ORI
42	HD 23985	HR 1188	112	HD 37481	HR 1933
43	HD 24398	ZET PER	113	HD 37490	OMG ORI
44	HD 24504	HR 1207	114	HD 37507	49 ORI
45	HD 24534	X PER	115	HD 37742	ZET ORI
46	HD 24640	HR 1215	116	HD 37744	HR 1950
47	HD 24912	XI PER	117	HD 37756	HR 1952
48	HD 25940	48 PER	118	HD 39985	HR 2075
49	HD 27045	OMG TAU	119	HD 42087	3 GEM
50	HD 27295	53 TAU	120	HD 42216	HD 42216
51	HD 27309	56 TAU	121	HD 42933	DEL PIC
52	HD 27396	53 PER	122	HD 45057	HD 45057
53	HD 27934	KAP TAU	123	HD 45348	ALF CAM
54	HD 27946	67 TAU	124	HD 45789	HD 45789
55	HD 28024	UPS TAU	125	HD 45995	HR 2370
56	HD 28319	THT-2 TAU	126	HD 46300	13 MON
57	HD 28548	81 TAU	127	HD 46885	HR 2413
58	HD 28556	83 TAU	128	HD 46966	HD 46966
59	HD 28879	HD 28879	129	HD 47129	HR 2422
60	HD 28910	RHO TAU	130	HD 47417	HD 47417
61	HD 29479	SIG-1 TAU	131	HD 47839	15 S MON
62	HD 29488	SIG-2 TAU	132	HD 48099	HR 2467
63	HD 31512	62 ERI	133	HD 48917	10 CMA
64	HD 32068	ZET AUR	134	HD 49961	HD 49961
65	HD 32249	PSI ERI	135	HD 50013	KAP CMA
66	HD 32630	ETA AUR	136	HD 50123	HR 2545
67	HD 32964	66 ERI	137	HD 51411	HR 2598
68	HD 33111	BET ERI	138	HD 52140	HR 2621
69	HD 33328	LAM ERI	139	HD 52670	HR 2640
70	HD 33904	MU LEP	140	HD 53138	OMI-2 CMA

Table 4-3. List of S-019 Stars. (2 of 4)

RECORD NUMBER	HD NUMBER	ALTERNATE NAME
141	HD 53344	HD 53344
142	HD 54605	DEL CMA
143	HD 54893	HR 2702
144	HD 54912	HR 2704
145	HD 55522	26 CMA
146	HD 55857	HR 2734
147	HD 55879	HR 2739
148	HD 55958	HR 2741
149	HD 55985	HR 2743
150	HD 56014	27 CMA
151	HD 56094	HD 56094
152	HD 56139	OMG CMA
153	HD 56342	HR 2756
154	HD 56455	HR 2761
155	HD 56554	HD 56554
156	HD 56779	HR 2770
157	HD 56576	HR 2774
158	HD 57060	29 UK CMA
159	HD 57061	TAU CMA
160	HD 57150	HR 2787
161	HD 57193	HD 57193
162	HD 57219	HR 2790
163	HD 57593	HR 2800
164	HD 58011	HD 58011
165	HD 58260	HD 58260
166	HD 58286	HR 2823
167	HD 58325	HR 2824
168	HD 58350	ETA CMA
169	HD 58420	HR 2829
170	HD 58612	HR 2841
171	HD 58978	HR 2855
172	HD 59026	HR 2856
173	HD 59136	HR 2860
174	HD 59495	HR 2870+71
175	HD 59527	HD 59527
176	HD 59550	HR 2873
177	HD 59864	HD 59864
178	HD 60098	HR 2885
179	HD 60108	HR 2889
180	HD 60312	HR 2895
181	HD 60344	HD 60344
182	HD 60606	HR 2911
183	HD 61071	HD 61071
184	HD 61330	HR 2937
185	HD 61429	HR 2944
186	HD 62315	HD 62315
187	HD 62623	3 PUP
188	HD 62747	HR 3004
189	HD 63308	HR 3025
190	HD 63425	HD 63425
191	HD 63462	OMI PUP
192	HD 63465	HR 3035
193	HD 63868	HD 63868
194	HD 64305	HR 3078
195	HD 64440	HR 3080
196	HD 65315	HR 3107
197	HD 66624	HR 3162
198	HD 66811	ZET PUP
199	HD 68092	HD 68092
200	HD 68161	HR 3203
201	HD 68273	GAM VEL
202	HD 68324	HR 3213
203	HD 68657	HR 3227
204	HD 68761	HD 68761
205	HD 68895	HR 3234
206	HD 68930	HR 3237
207	HD 69106	HD 69106
208	HD 69144	HR 3244
209	HD 69168	HD 69168
210	HD 69302	HR 3250
211	HD 69404	HD 69404
212	HD 69973	HD 69973
213	HD 70309	HD 70309
214	HD 70556	HR 3283
215	HD 70930	HR 3294
216	HD 71935	HR 3350
217	HD 72108	HR 3358
218	HD 72232	HR 3363
219	HD 72737	HR 3386
220	HD 73105	HD 73105
221	HD 74071	HR 3440
222	HD 74146	HR 3442
223	HD 74195	OMI VEL
224	HD 74319	HD 74319
225	HD 74371	HR 3456
226	HD 74956	DEL VEL
227	HD 75241	HD 75241
228	HD 75821	HR 3527
229	HD 76004	HD 76004
230	HD 76556	HR 3560
231	HD 76566	HR 3562
232	HD 76726	HR 3571
233	HD 77002	HR 3582
234	HD 77320	HR 3593
235	HD 77475	HR 3600
236	HD 78016	HD 78016
237	HD 79186	HR 3654
238	HD 79351	A. CAR
239	HD 79416	HR 3661
240	HD 79447	HR 3663
241	HD 79694	HR 3672
242	HD 79735	HR 3674
243	HD 80404	IOT CAR
244	HD 83944	HR 3856
245	HD 83979	ZET CHA
246	HD 84226	HR 3868
247	HD 84609	HR 3883
248	HD 85871	HR 3920
249	HD 86440	PHI VEL
250	HD 87737	ETA LEO
251	HD 87901	ALF LEO
252	HD 90653	HR 4114
253	HD 91316	RHO LEO
254	HD 91465	P2 CAR
255	HD 92664	HR 4185
256	HD 92740	HR 4188
257	HD 93030	THT CAR
258	HD 93194	HR 4205
259	HD 93845	DEL-2 CHA
260	HD 97583	HR 4355
261	HD 100841	LAM CEN
262	HD 101379	HR 4492
263	HD 102249	LAM MUS
264	HD 102647	BET LEO
265	HD 103079	HR 4549
266	HD 106983	ZET CRU
267	HD 108248	ALF CRU
268	HD 110335	HR 4823
269	HD 112078	LAM CRU
270	HD 113904	THT MUS
271	HD 114529	HR 4975
272	HD 114911	ETA MUS
273	HD 115846	HD 115846
274	HD 116658	ALF VIR
275	HD 117651	HR 5093
276	HD 120640	HR 5206
277	HD 120991	HR 5223
278	HD 121483	HD 121483
279	HD 121790	UPS-1 CEN
280	HD 122451	BET CEN

Table 4-3. List of S-019 Stars. (3 of 4)

RECORD NUMBER	HD NUMBER	ALTERNATE NAME
281	HD 124367	HR 5316
282	HD 125238	IOT LUP
283	HD 125286	HR 5358
284	HD 125721	HR 5375
285	HD 125823	HR 5378
286	HD 126341	TAU-1 LUP
287	HD 126759	HD 126759
288	HD 126963	HR 5413
289	HD 127381	SIG LUP
290	HD 127971	HR 5439
291	HD 127972	ETA CEN
292	HD 128345	RHO LUP
293	HD 128620	ALF CEN
294	HD 128974	HR 5466
295	HD 129056	ALF LUP
296	HD 129092	HD 129092
297	HD 129116	HR 5471
298	HD 129422	HR 5482
299	HD 129929	HD 129929
300	HD 130559	MU LIB
301	HD 130701	AX CIR
302	HD 130807	OMI LUP
303	HD 130819	ALF-1 LIB
304	HD 130841	ALF-2 LIB
305	HD 131120	HR 5543
306	HD 131492	THT CIR
307	HD 132058	BET LUP
308	HD 132200	KAP CEN
309	HD 133738	HD 133738
310	HD 133955	LAM LUP
311	HD 134657	HD 134657
312	HD 134687	HR 5651
313	HD 135160	HR 5661
314	HD 135240	DEL CIR
315	HD 135591	HR 5680
316	HD 135734	MU LUP
317	HD 135917	HD 135917
318	HD 136415	GAM CIR
319	HD 136504	EPS LUP
320	HD 138690	GAM LUP
321	HD 140008	PSI-2 LUP
322	HD 140784	HR 5860
323	HD 141637	1 SCO
324	HD 142114	2 SCO
325	HD 142165	HR 5906
326	HD 142184	HR 5907
327	HD 142250	HR 5910
328	HD 142301	3 SCO
329	HD 142883	HR 5934
330	HD 142983	48 LIB
331	HD 142990	HR 5942
332	HD 143018	PI SCO
333	HD 143118	ETA LUP
334	HD 143699	HR 5967
335	HD 144294	THT LUP
336	HD 144661	HR 5998
337	HD 145842	THT NOR
338	HD 147152	HR 6083
339	HD 147165	SIG SCO
340	HD 147894	HD 147894
341	HD 147971	EPS NOR
342	HD 148478	ALF SCO
343	HD 148605	22 SCO
344	HD 149038	MU NOR
345	HD 149404	HR 6164
346	HD 149438	TAU SCO
347	HD 149499	HD 149499
348	HD 149711	HR 6174
349	HD 149757	ZET OPH
350	HD 150041	HD 150041
351	HD 150136	HR 6187
352	HD 150168	HR 6188
353	HD 150898	HR 6219
354	HD 151515	HD 151515
355	HD 151804	HR 6245
356	HD 151890	MU-1 SCO
357	HD 151932	HR 6249
358	HD 151985	MU-2 SCO
359	HD 152236	ZET-1 SCO
360	HD 152408	HR 6272
361	HD 152478	HR 6274
362	HD 153261	HR 6304
363	HD 153716	HR 6320
364	HD 153919	HD 153919
365	HD 154090	HR 6334
366	HD 155806	HR 6397
367	HD 155869	HD 155889
368	HD 156385	HD 156385
369	HD 157042	IOT ARA
370	HD 157056	THT OPH
371	HD 157792	44 OPH
372	HD 157832	HD 157832
373	HD 157864	HR 6490
374	HD 157978	HR 6497
375	HD 158408	UPS SCO
376	HD 158643	51 OPH
377	HD 158704	HR 6520
378	HD 158926	LAM SCO
379	HD 159532	THT SCO
380	HD 162978	HR 6672
381	HD 163472	HR 6684
382	HD 164402	HR 6716
383	HD 164447	HR 6720
384	HD 164577	68 OPH
385	HD 164794	9 SGR
386	HD 164852	96 HER
387	HD 165016	HD 165016
388	HD 165024	THT ARA
389	HD 165763	HD 165763
390	HD 166182	102 HER
391	HD 166937	MU SGR
392	HD 167263	10 SGR
393	HD 167264	15 SGR
394	HD 168905	HR 6875
395	HD 169022	EPS SGR
396	HD 169407	ALF TEL
397	HD 170405	DEL-1 TEL
398	HD 171034	HR 6960
399	HD 172167	ALF LYR
400	HD 173417	HR 7044
401	HD 173648	ZET LYR
402	HD 173948	LAM PAV
403	HD 174179	HR 7081
404	HD 174565	8 LYR
405	HD 174638	BET LYR(.2
406	HD 174638	BET LYR(.5
407	HD 174959	HR 7115
408	HD 175426	DEL-1 LYR
409	HD 175876	HD 175876
410	HD 176316	HR 7174
411	HD 176437	GAM LYR
412	HD 177724	ZET AQL
413	HD 181454	BET-1 SGR
414	HD 181623	BET-2 SGR
415	HD 181869	ALF SGR
416	HD 183007	HR 7392
417	HD 184905	V1264 CYG
418	HD 185872	14 CYG
419	HD 186618	HD 186618
420	HD 187459	HR 7551

Table 4-3. List of S-019 Stars. (4 of 4)

RECORD NUMBER	HD NUMBER	ALTERNATE NAME
421	HD 187879	V380 CYG
422	HD 188209	HR 7589
423	HD 188252	HR 7591
424	HD 188439	V619 CYG
425	HD 188892	22 CYG
426	HD 189687	25 CYG
427	HD 191610	28 CYG
428	HD 192103	V1042 CYG
429	HD 192163	HD 192163
430	HD 192577	31 CYG
431	HD 192909	32 CYG
432	HD 193182	HD 193182
433	HD 193237	P CYG
434	HD 193369	36 CYG
435	HD 193536	HR 7777
436	HD 194335	HR 7807
437	HD 197345	ALF CYG
438	HD 199081	57 CYG
439	HD 199579	HR 8023
440	HD 200310	60 CYG
441	HD 200595	HR 8064
442	HD 201733	HR 8103
443	HD 201819	HR 8105
444	HD 202214	HR 8119
445	HD 202347	HD 202347
446	HD 202904	UPS CYG
447	HD 203064	68 CYG
448	HD 203280	ALF CEP
449	HD 203338	HR 8164
450	HD 203467	6 CEP
451	HD 204172	69 CYG
452	HD 204403	70 CYG
453	HD 205021	BET CEP
454	HD 205139	HR 8243
455	HD 205314	HR 8246
456	HD 206165	9 CEP
457	HD 206267	HR 8281
458	HD 206365	HD 206365
459	HD 206672	PI-1 CYG
460	HD 206696	HD 206696
461	HD 207330	PI-2 CYG
462	HD 208682	HR 8375
463	HD 208816	VV CEP
464	HD 208947	HR 8384
465	HD 209339	HR 8399
466	HD 209481	14 CEP
467	HD 209790	XI CEP
468	HD 209975	19 CEP
469	HD 210839	LAM CEP
470	HD 211242	HR 8490
471	HD 212120	2 LAC
472	HD 212593	4 LAC
473	HD 212883	HR 8549
474	HD 212976	HR 8553
475	HD 213310	5 LAC
476	HD 214168	8 LAC
477	HD 214263	HD 214263
478	HD 214680	10 LAC
479	HD 214993	12 DD LAC
480	HD 216916	16 EN LAC
481	HD 217050	EW LAC
482	HD 217675	OMI AND
483	HD 217943	HR 8777
484	HD 218045	ALF PEG
485	HD 218376	1 CAS
486	HD 218440	HR 8803
487	HD 218537	HR 8808
488	HD 219634	HR 8854
489	HD 220057	HD 220057
490	HD 221253	AR CAS
491	HD 222109	HR 8962
492	HD 222173	101 AND
493	HD 222439	KAP AND
494	HD 224572	SIG CAS

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SECTION 5 - SAMPLE LISTINGS

The following listings are intended for two purposes:

(1) to be correlated with the record descriptions in Section 2 of this document;

(2) to assist catalogue requestors in verifying that the request was filled properly.

The first lines of the listing underneath the heading are sequential numbers for the printed characters across the page. The numbers are to be read vertically. The bottom row contains the ones digits of the column numbers. For example:

```
          11111111 ---
12345678901234567 ---
|                 |
Column 1          Column   17
```

If each record has been split up into several lines for printing, this fact has been noted in the heading. Each line is printed starting at column 1 as defined by the column-number heading. (One byte as described in Section 2 above constitutes one character position in the listing.)

The heading lines and column numbers do not appear in the machine-readable file itself.

The listing for File 1 of the catalogue (described in Table 2-1) gives only the first record. The listing for File 2 (described in Table 2-2) gives the first one hundred records, and is made from a sample file having a blocking factor of 100 (see Section 3 above). The file you have received will very likely have another blocking factor.

```
5019 CATALOGUE DATA FILE -- RECORD NO. 1

          111111111222222222233333333344444444445555555556666666666677777777778
1234567890123456789012345678901234567890123456789012345678901234567890123456789 0
HD     358 ALF AND    SL4- 67 217  -10.5    -.7 23  .7  .95 SL4- 68  72  -10.5   -.
7 19  .7 1.10 SL4- 69  28  -10.5    -.7 19  .8  .97
                                                  1.23+-

                                                                                U1523 4 63U2023 4
 65U2273 5  3U2133 5209U1973 6 84U2153 6  6 2163 6 43U1963 6194U1773 7 12 2343 9
 47 2453 9344 2243 9370 2183 9207 1913 9236 211310244 221310200 193310203 190310
 49 176310144 186310234 174310199 1943 9 18 1613 9 83 1463 9 82 1443 9 12 1343 8
249 1363 9155 172310119 205311106 209311 66 226311  2 194311 12 226311 13 227312
 53 212312 38 206312 79 195312 27 203312 34 230312 21 235312 32 207312 61 221312
  3 221312 13 218313 77 220313 27 217313 27 213314 56 241314 58 225314105 224314
 59 221314 73 208314 59 211315 82 206315 82 198315104 194315104 211314133 205314
129 208314121 201315128 185315102 185316146 202316106 200316130 219315178 207315
172 208314192 209315206 201315188 194316191 203318153 206319102 200319 68 207319
100 195318 99 189317147 194317232 204317168 197318118 195319 83 197319 77 188318
196 180318151 179318118 161318124 156317164 158317176 166317184 177318180 172318
155 178318 84 203318 54 204318 32 200318 23 198318130 199318145 204318 79 208317
 98 203317135 192317140 198317 88 206318126 208318112 201318 98 204318111 202318
136 200318165 201319 97 202319 58 207320 10 211320 27 214319 27 219319 93 227319
 89 227319 83 218319 90 223319 86 230319 71 227319 66 222319106 213319114 205319
 76 212319 49 209319 42 196319 64 196319 54 205319 62 216319 54 214319 78 211319
 48 213319 51 220319 36 226319 81 218319 70 210319 19 210319 46 206319 53 202319
 36 198319 24 197319 45 196319 71 199319 45 210319 61 217319 80 217319 89 209319
 92 200319 86 200319 78 204319 49 204319 20 208319 47 219319100 222319131 216319
130 214318 86 221318 88 229318131 229318134 228318133 236318120 234318 72 223319
 66 216319 62 215319 33 213319 33 206319 69 197319 81 196319 23 204318 30 212318
  8 207318 19 199318 10 196318 34 190319 33 185319 56 185319 83 183319 48 180318
 52 180318 72 179318 64 179318 81 173319 86 166319 66 167319 51 172319 45 173318
 52 174318 65 174318 56 172318 27 169318 16 169318 60 175318 64 182317 58 186317
 86 185317115 181317120 179317102 176317 84 168317 83 160317102 156318115 157318
 92 157318 80 156318 65 151318 62 143318 65 139318 78 139318 94 142318 82 146318
 82 148318 99 145318108 141318106 141318105 144317 98 149317 88 152317 76 152317
 75 150317 79 150317 83 152317 87 155317 98 157317 97 157316 98 156316110 154316
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 66            152317 84 156317 95 153317108 144316102 147316 76 147316 70 142316
 80 149316 81 143316112 127316102 125316 81 131316113 135316149 143315182 144315
180 132316118 128316 94 126316 38 126315 68 126315 98 135315113 134315 79 126315
 70 128315154 128315123 132315134 128315154 124315113 122314 88 123314 52 127314
 19 128314 20 129314 54 132313105 135313102 132313 73 132313112 140313 87 141312
100 139312 77 137312 63 134312 54 126312 38 122312 72 124312 29 129312 45 125312
 30 123311 17 126311 41 128311 63 129311 66 127311 51 131311 71 133311 84 127311
 69 117311 31 110311 25 110311 58 118311166 119310204 116310204 109310168 104310
131 106310131 111310146 1143 9131 1163 9122 1203 8167 1233 8208 1283 8181 1293 8
123 1223 8127 1143 8174 1113 8188 1083 8183 1033 8200 9974 8222 1003 8209 1023 8
```

First Record of Data File (1 of 2)

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149 1043 8 90 1093 7 97E1123 7154E1143 7192E1143 7207E1133 7228E1103 7244E1083 7
236E1053 7204E1023 7179 9764 7166 9404 7162 9084 7183 8904 7241 8954 7304E9214 7
353E9474 7393E9504 7419E9214 7411E8734 7379E8204 7352 7864 8329 7704 8285 7624 8
232 7544 8211            7974 8308 7644 8243 7604 7242E8124 7270E8434 7281E8374 6
332E8164 6417E8044 6427E7574 7343E6984 7311E6544 7312 6244 7277E6554 7274E6854 7
268E6684 7251E6074 7260 5604 7282 5614 7301E5664 7329E5734 7338E5814 7328E5794 6
333E5904 6324E6154 6292E6294 6266E6334 6259E6384 5279E6284 5308E5984 5315E5674 6
317E5504 6303E5494 6293E5524 5305E5524 5314E5434 5287E5334 5240E5304 5232E5224 5
264E5134 5270E5094 5229E5094 5198E5014 5221E4734 6273E4354 6296E4134 6289E4154 6
277E4374 6298E4584 5342E4684 5365E4674 5371E4584 5381E4424 5392E4204 5381E4074 5
343E4034 5309E4034 5281E4034 5242E4064 5188E4094 5148E4104 5139E4054 5133E3934 5
139E3784 5174E3604 5226E3464 5275E3424 5297E3504 5293E3664 4259E3884 4211E4044 4
150E4114 4 94E4084 4 61E3964 4 76E3814 4125          E4114 4 95E3964 4 83E3684 4
134E3524 4256E3434 4291E3444 4286E3464 4240E3414 4200E3384 4194E3384 4156E3264 4
141E3064 4174E3024 4195E3134 4195E3124 4212E2954 4243E2874 4264E2964 4261E3074 3
223E3114 3165E3054 3120E2904 3 99E2724 4 89E2574 4 89E2504 4 93E2524 4 97E2624 4
119E2824 3138E3084 3118E3264 3 67E3164 3 24E2894 3 42E2614 3 80E2474 3114E2454 3
116E2564 3 87E2654 3 59E2694 3161E2664 3255E2614 3323E2574 3359E2524 4379E2514 4
390E2534 4392E2584 4383E2684 3356E2774 3322E2874 3281E2964 3246E3034 3215E3094 3
195E3134 3183E3154 3174E3154 3169E3164 4161E3194 4151E3244 4137E3304 4119E3384 4
110E3474 4104 000 00 00  71 10150  63 15225  73 18117  58 19 42  58 19 57  76 18
 34  99 17 80 112 15 95 115 11373 133  8206E185  6339E230  5281E278  3174
```

```
S019 EXPOSURE DATA FILE
FIRST BLOCK OF FILE

LOGICAL RECORD LENGTH IS 100 BYTES
BLOCK SIZE IS 10000 BYTES
THERE ARE 100 RECORDS IN THIS BLOCK (BLOCKING FACTOR)
EACH RECORD IS PRINTED IN 2 LINES OF
     65, AND 35 CHARACTERS


         1111111111222222222233333333334444444444555555555566666
12345678901234567890123456789012345678901234567890123456789012345
SL2-001                  CAL.   730515                  005
            FLIGHT
SL2-002  10:30 -61.4    341   730605   156:20:10:47   005   12.8    87
 270U  272  ROT OFF 2 DEG
SL2-003  11:58 -65.5    360   730605   156:20:15:27   005    2.7    56
 270   212  ROT OFF 2 DEG
SL2-004  11:14 -62.6    353   730605   156:20:20:32   005    8.0    78
 270   224  ROT OFF 2
SL2-005 (20:48 +45.6)   595   730605   156:20:25:03   005   26.9
 270   216  HIFOG,OFF 2
SL2-006 (20:18 +38.8)   583   730605   156:20:29:12   005   18.2
 270   213  HIFOG,OFF 2
SL2-007   3:51 -70.6    897   730606   157:20:59:     005   25.8   147
 270U (270) FOGGED
SL2-008  10:35 -60.0    341   730606   157:21:05:48   005   13.3    91
 270   256
SL2-009  10:35 -60.0    341   730606   157:21:10:41   005   13.3    91
  90    87
SL2-010   9:02 -60.1    338   730606   157:21:13:04   005   23.6   109
 270   215
SL2-011   9:02 -60.1    338   730606   157:21:16:56   005   23.6   109
  90
SL2-012  20:09 +36.3    597   730606   157:21:19:06   005   14.5    47
 270   221  ->580+583
SL2-013  21:19 +35.8    603   730606   157:21:23:52   005   25.3    66
 270   222
SL2-014  21:19 +35.8    603   730606   157:21:27:49   005   25.3    66
  90    72
SL2-015  20:56 +44.8    596   730606   157:21:29:51   005   26.9    55
 270   201  ->595+601
SL2-016  20:20 +47.8    584   730606   157:21:32      005   24.2    43
  90        END:21:35:01
SL2-017  10:33 -78.6    001   730617   168:11:52      005   10.9
  90N       CHA T-ASSOC.
SL2-018  10:47 -78.8   (002)  730617   168:11:54      005    9.9
  30N
```

First Block of Exposure File (1 of 5)

```
         111111111122222222223333333333444444444455555555556666666
123456789012345678901234567890123456789012345678901234567890123456789012345
SL2-019  10:57 -77.8   (003)  730617   168:11:55      005    9.9
  90N
SL2-020  12:23 +01.0    004   730617   168:11:57      005   19.2
  30N       ED23
SL2-021  12:25 +01.7   (005)  730617   168:11:58      005   19.2
  90N
SL2-022  12:19 +01.5   (006)  730617   168:12:00      005   20.2
  90N
SL2-023  14:12 +24.0    007   730617   168:12:02      005    8.2
  30N       ED23
SL2-024  14:15 +24.9   (008)  730617   168:12:03      005    8.2
  90N
SL2-025  14:10 +24.6   (009)  730617   168:12:05      005    9.2
  90N
SL2-026  13:53 +53.5    912   730617   168:12:07      005   30.4
  90N
SL2-027  13:53 +53.5    912   730617   168:12:09      005   30.4
  90N
SL2-028  13:19 +46.3    911   730617   168:12:11      005   29.8
  90N
SL2-029  13:19 +46.3    911   730617   168:12:13      005   29.8
  90N
SL2-030  23:07 +09.8    010   730617   168:12:15      005   27.5
  30N       ED23
SL2-031  23:09 +09.1   (011)  730617   168:12:16      005   27.5
  90N
SL2-032  23:10 +10.3   (012)  730617   168:12:18      005   28.5
  90N
SL2-033   5:38 -68.4    930   730617   168:16:32      005   28.9
  90N       LMC
SL2-034   5:38 -68.4    930   730617   168:16:34      005   28.9
  30N
SL2-035   5:16 -68.3    931   730617   168:16:35      005   28.9
  90N       LMC
SL2-036   5:16 -68.3    931   730617   168:16:37      005   28.9
  30N
SL2-037   4:58 -68.1    932   730617   168:16:38      005   28.9
  30N       LMC
SL2-038  12:28 +20.0    909   730617   168:16:39      005   26.3
  90N
SL2-039  17:00 +61.0    913   730617   168:16:41      005   23.9
  90N
SL2-040  12:18 +14.6    906   730617   168:16:43      005   26.1
  90N
SL2-041  12:18 +14.6    906   730617   168:16:45      005   26.1
  90N
```

```
          111111111122222222223333333333444444444455555555556666666
123456789012345678901234567890123456789012345678901234567890123456789012345
SL2-042   12:27 +13.0    907   730617   168:16:47        005   23.1
  90N
SL2-043   12:27 +13.0    907   730617   168:16:49        005   23.1
  90N
SL2-044   22:00 +43.3    918   730617   168:16:51        005   29.6
  90N
SL2-045   22:00 +41.9    917   730617   168:16:53        005   28.6
  90N
SL2-046                CAL.   730629                    005
          FLIGHT
SL2-047                CAL.   730629                    005
          FLIGHT
SL2-048                CAL.   730702                    005
          LAB
SL3-001   12:20 -64.4    367   730804   216:21:07:04     005   29.6   107
  30      26
SL3-002   12:48 -60.7    371   730804   216:21:14        005   29.3   104
  270   (200)
SL3-003   13:52 -46.7    382   730804   216:21:18        005   28.2   111
  270   (200)
SL3-004   14:45 -16.0    408   730804   216:21:23        005   28.1   138
  270   (200)
SL3-005   12:31 -68.5    369   730804   216:21:27        005   26.0   106
  270   (270)  ATM. EXT., END:21:31:55
SL3-006   22:32 +39.1    620   730804   216:21:33:46     005    0.3    13
  270     269
SL3-007   13:58 -61.1    383   730810   222:18:28:41     005   25.5   104
  270     221
SL3-008   13:58 -61.1    383   730810   222:18:32:50     005   25.5   104
  90      76
SL3-009   13:58 -61.1    383   730810   222:18:34:22     005   25.5   104
  30      28
SL3-010   14:19 -46.8    401   730810   222:18:35:50     005   28.7   115
  270     218
SL3-011   14:24 -41.6    403   730810   222:18:40:29     005   29.7   119
  270     222
SL3-012   14:54 -44.3    409   730810   222:18:45:11     005   23.5   111
  270     222
SL3-013   14:54 -44.3    409   730810   222:18:49:09     005   23.5   111
  90      77
SL3-014   14:54 -44.3    409   730810   222:18:50:43     005   23.5   111
  30      29  ATM. EXT.
SL3-015   15:57 -14.4    424   730810   222:18:52:18     005   17.4   146
  270     202
SL3-016   15:57 -14.4    424   730810   222:18:56:08     005   17.4   146
  90      76
```

```
          1111111111222222222233333333334444444444555555555566666666
12345678901234567890123456789012345678901234567890123456789012345
SL3-017   23:33 +44.0    629   730810   222:18:58:35   005    6.8    32
 270    218
SL3-018   14:40 -37.3    407   730810   222:20:01:14   005   28.0   124
 270    265
SL3-019   20:17 +45.5    584   730810   222:20:06:59   005    3.0   302
 270    265
SL3-020   20:17 +45.5    584   730810   222:20:11:52   005    3.0   302
  90     78
SL3-021   20:48 +45.6    595   730810   222:20:14:21   005    1.9   320
 270    225
SL3-022   20:48 +45.6    595   730810   222:20:18:22   005    1.9   320
  90     77
SL3-023   20:48 +45.6    595   730810   222:20:19:53   005    1.9   320
  30     28
SL3-024   18:37 +39.0    556   730810   222:20:21:38   005    7.0   252
 270    227
SL3-025   18:37 +39.0    556   730810   222:20:25:38   005    7.0   252
  90     78
SL3-026   18:37 +39.0    556   730810   222:20:27:12   005    7.0   252
  30     28
SL3-027   19:53 +47.8    576   730810   222:20:28:41   005    6.8   290
 270    230
SL3-028   19:53 +47.8    576   730810   222:20:32:46   005    6.8   290
  90     77
SL3-029   13:13 -66.6    375   730810   222:21:35:29   005   27.0   106
 270    239
SL3-030   13:13 -66.6    375   730810   222:21:40:01   005   27.0   106
  90     82
SL3-031   14:06 -56.0    701   730810   222:21:42:18   005   26.7   107
 270    231
SL3-032   14:29 -49.2    405   730810   222:21:47:06   005   26.1   111
 270    235
SL3-033   14:29 -49.2    405   730810   222:21:51:16   005   26.1   111
  30     30
SL3-034   18:51 +33.1    560   730810   222:21:52:54   005    0.4   250
 270    227
SL3-035   21:10 +44.9    601   730810   222:21:57:32   005    0.0   325
 270    232
SL3-036   21:10 +44.9    601   730810   222:22:01:40   005    0.0   325
  30     28
SL3-037   22:55 +42.5    623   730810   222:22:03:19   005    2.2    18
 2700   270
SL3-038   22:55 +42.5    623   730810   222:22:07:01   005    2.2    18
  90     78
SL3-039   10:02 -81.4    819   730813   225:00:51:     005   23.1   134
 270          FOGGED
```

```
          111111111122222222223333333333444444444455555555556666666
123456789012345678901234567890123456789012345678901234567890123456789012345
SL3-040   15:44 -03.8    840   730813   225:00:56:05   005   25.3   152
 270    230   FOGGED
SL3-041   15:02 -48.9    411   730813   225:01:01:04   005   22.9   107
 270    227   FOGGED
SL3-042   15:20 -41.7    415   730813   225:01:05:54   005   21.4   113
 270          HIFOG
SL3-043   15:20 -41.7    415   730813   225:01:09:57   005   21.4   113
  90     78   FOGGED
SL3-044                (701)   730813   225:01:12      005   28.2
 270U          HI FOG, EARTH
SL3-045                (701)   730813   225:01:17      005   28.2
 270U          HI FOG, EARTH
SL3-046                (701)   730813   225:01:22      005   28.2
 180U          FOGGED, EARTH
SL3-047                 433    730815   227:13:28      005    8.5
 270           NO IMD
SL3-048                 433    730815   227:13:35      005    8.5
 270           NO IMD
SL3-049                 435    730815   227:13:41      005    7.5
 270           NO IMD
SL3-050                 435    730815   227:13:47      005    7.5
 270U          NO IMD
SL3-051                 435    730815   227:13:51      005    7.5
  90           NO IMD
SL3-052                 417    730815   227:13:54      005   20.6
 270           FOGGED, NO IMD
```

SECTION 6 - SAMPLE PROGRAM AND OUTPUT

A sample program to read in and print a portion of the S-019 catalogue is given in this section, along with the program's output for the first record in the catalogue. Those intending to use this program or portions of it should read the comment cards thoroughly first.

Sample Program (1 of 4)

```
C.......................................................................S19PRT10
C       PROGRAM S19PRT                                                  S19PRT20
C                                                                       S19PRT30
C       SAMPLE PROGRAM TO PRINT OUT THE MACHINE-READABLE VERSION OF     S19PRT40
C       THE S-019 SPECTROPHOTOMETRIC CATALOGUE DISTRIBUTED BY THE       S19PRT50
C       ASTRONOMICAL DATA CENTER, NASA GODDARD SPACE FLIGHT CENTER.     S19PRT60
C                                                                       S19PRT70
C       THIS PROGRAM IS IN IBM FORTRAN 66.  IT DOES NOT USE SPECIAL     S19PRT80
C       DATA TYPES, SO IT SHOULD RUN ON MOST MACHINES WITH FEW IF       S19PRT90
C       ANY CHANGES.  BECAUSE THE PURPOSE OF THE PROGRAM IS TO SHOW     S19PR100
C       HOW TO READ THE S-019 DATA FOR COMPUTATION, SOME DATA THAT      S19PR110
C       COULD HAVE BEEN READ IN AS CHARACTER STRINGS FOR                S19PR120
C       PRINTING ARE READ INTO COMPUTATIONAL VARIABLES INSTEAD.         S19PR130
C                                                                       S19PR140
C       FORTRAN UNIT  6 = PRINTED OUTPUT                                S19PR150
C       FORTRAN UNIT 10 = S-019 CATALOGUE INPUT                         S19PR160
C                                                                       S19PR170
C       WRITTEN BY R. S. HILL, SYSTEMS AND APPLIED SCIENCES CORP.,      S19PR180
C         21 NOVEMBER 1983                                              S19PR190
C.......................................................................S19PR200
C                                                                       S19PR210
C..     DECLARATIONS OF INPUT DATA.. THE VARIABLES ARE GIVEN IN THE ORDER S19PR220
C       IN WHICH THEY OCCUR IN THE RECORD.. INTEGERS ARE USED TO HOLD   S19PR230
C       SINGLE CHARACTERS                                               S19PR240
C                                                                       S19PR250
C..     STAR NAMES                                                      S19PR260
C                                                                       S19PR270
        INTEGER NAME1(10),NAME2(10)                                     S19PR280
C                                                                       S19PR290
C..     DATA ON UP TO FIVE EXPOSURES                                    S19PR300
C                                                                       S19PR310
        INTEGER PLATE(7,5),EXPOS(5),EXPDEF(5)                           S19PR320
        REAL XMM(5),YMM(5)                                              S19PR330
        INTEGER SCANS(5)                                                S19PR340
        REAL WEIGHT(5),SCALE(5)                                         S19PR350
C                                                                       S19PR360
C..     FLUX ADJUSTMENT FACTOR                                          S19PR370
C                                                                       S19PR380
        INTEGER COM1                                                    S19PR390
        REAL R                                                          S19PR400
        INTEGER COM2(3)                                                 S19PR410
C                                                                       S19PR420
C..     FLUXES AND MAGNITUDES                                           S19PR430
C                                                                       S19PR440
        INTEGER FCOM(500),D(500),C(500)                                 S19PR450
        REAL FWGT(500),SDEV(500)                                        S19PR460
        INTEGER MCOM(14)                                                S19PR470
        REAL MAG(14),MWGT(14),MSDEV(14)                                 S19PR480
C                                                                       S19PR490
C..     DECLARATIONS OF CONSTANTS FOR MAPPING THE SEQUENCE NUMBER OF    S19PR500
```

```
C       A FLUX FIELD (1...514) TO A WAVELENGTH
C
        INTEGER BNDWTH(4) /2,5,10,20/
        INTEGER MINWAV(4) /1310,1800,2300,3000/
        INTEGER NFLUX(4) /260,105,75,60/
        INTEGER INTBND(14) /135,139,148,154,161,166,172,181,192,204,219,
      * 245,280,360/
C
C..     THIS PROGRAM PROCESSES EACH RECORD IN TURN AND TERMINATES
C       IF IT REACHES END-OF-FILE
C
        KOUNT=0
  100   READ (10,1,END=999) NAME1,NAME2,((PLATE(J,I),J=1,7),
      * EXPOS(I),EXPDEF(I),XMM(I),YMM(I),SCANS(I),WEIGHT(I),
      * SCALE(I),I=1,5),COM1,R,COM2,(PCOM(I),D(I),C(I),FWGT(I),
      * SDEV(I),I=1,500),(MCOM(I),MAG(I),MWGT(I),MSDEV(I),I=1,14)
    1 FORMAT (10A1,10A1,5(7A1,1X,I3,A1,1X,F5.1,1X,F5.1,1X,I2,
      * 1X,F3.1,1X,F4.2,1X),A1,F4.2,3A1,255(A1,I3,I1,F2.1,F3.1),
      * 245(A1,I3,I1,F2.1,F3.1),14(A1,F3.2,1X,F2.1,F3.1))
C
C..     THIS PROGRAM ENDS AFTER PROCESSING FIVE STARS.. THE WHOLE
C       CATALOGUE WOULD PRODUCE MANY, MANY LINES OF OUTPUT.. THE
C       PROGRAM CAN BE MODIFIED EASILY TO PRINT A PARTICULAR RECORD
C       OR SET OF RECORDS.. SEE TABLE 4-3.. SECTION 5 GIVES THE LISTING
C       PRODUCED BY THIS PROGRAM FOR THE FIRST STAR ONLY, ALPHA
C       ANDROMEDAE
C
        KOUNT=KOUNT+1
        IF (KOUNT .GT. 5) GO TO 999
C
C..     PRINT STAR NAME, EXPOSURE DATA, AND FLUX ADJUSTMENT FACTOR
C
        WRITE (6,2) NAME1,NAME2
    2   FORMAT (///'1',10A1,3X,' *** BEGINNING OF DATA FOR STAR *** ',
      * 3X,10A1)
        WRITE (6,3)
    3   FORMAT (//' PLATE      EXP TIME    X(MM)     Y(MM)   SCANS ',
      * ' WEIGHT     SCALE'/)
        DO 150 I=1,5
        IF (EXPOS(I) .EQ. 0 .AND. WEIGHT(I) .EQ. 0) GO TO 150
        WRITE (6,4) (PLATE(J,I),J=1,7),EXPOS(I),EXPDEF(I),XMM(I),
      * YMM(I),SCANS(I),WEIGHT(I),SCALE(I)
    4   FORMAT (1X,7A1,5X,I3,A1,5X,F5.1,4X,F5.1,4X,I2,5X,F3.1,6X,F4.2)
  150   CONTINUE
        WRITE (6,5) COM1,R,COM2
    5   FORMAT (//' FLUX ADJUSTMENT FACTOR = ',A1,F4.2,3A1/)
C
C..     PRINT FLUXES THREE ON A LINE.. THERE ARE TWO MAIN APPROACHES
C       TO THIS PROBLEM.. ONE IS TO BUILD AN OUTPUT LINE AND PRINT IT..
C       THE OTHER IS TO USE THE OVERSTRIKE CARRIAGE CONTROL CHARACTER..
```

```
C     THIS PROGRAM USES OVERSTRIKES
C
      WRITE (6,6)
    6 FORMAT (/' LAMBDA     FLUX    WEIGHT  ST-DEV     ',
     *         'LAMBDA     FLUX    WEIGHT  ST-DEV     ',
     *         'LAMBDA     FLUX    WEIGHT  ST-DEV '/)
C
C..   LOOP THROUGH THE FOUR GROUPS OF NARROW-BAND FLUXES
C
      IDONE=0
      DO 500 I=1,4
      IST=IDONE+1
      LST=IDONE+NFLUX(I)
      IWIDTH=BNDWTH(I)
      LAMBDA=MINWAV(I)
      LINE=1
C
C..   LOOP THROUGH THE FLUXES ASSOCIATED WITH EACH BANDWIDTH..
C     BLANK FIELDS (CONVERTED WHEN READ TO ZEROES) INDICATE NO
C     DATA AT THAT WAVELENGTH
C
      DO 300 J=IST,LST
      IF (D(J) .EQ. 0 .AND. C(J) .EQ. 0) GO TO 300
      FLX=D(J)/100.0
      IEXP=-6-C(J)
      GO TO (210,220,230),LINE
  210 WRITE (6,10) LAMBDA,FCOM(J),FLX,IEXP,FWGT(J),SDEV(J)
   10 FORMAT (1X,I4,A1,3X,F4.2,'E',I3,3X,F3.1,4X,F4.1,5X)
      GO TO 250
  220 WRITE (6,20) LAMBDA,FCOM(J),FLX,IEXP,FWGT(J),SDEV(J)
   20 FORMAT ('+', 35X,I4,A1,3X,F4.2,'E',I3,3X,F3.1,4X,F4.1,5X)
      GO TO 250
  230 WRITE (6,30) LAMBDA,FCOM(J),FLX,IEXP,FWGT(J),SDEV(J)
   30 FORMAT ('+', 70X,I4,A1,3X,F4.2,'E',I3,3X,F3.1,4X,F4.1)
  250 LINE=LINE+1
      IF (LINE .GT. 3) LINE=1
  300 LAMBDA=LAMBDA+IWIDTH
      WRITE (6,50)
   50 FORMAT (//)
  500 IDONE=LST
C
C..   PRINT INTERMEDIATE-BAND MAGNITUDES
C
      WRITE (6,60)
   60 FORMAT (//' LAMBDA    MAGNITUDE    WEIGHT    ST-DEV'/)
      DO 600 I=1,14
      IF (MAG(I) .EQ. 0.0 .AND. MWGT(I) .EQ. 0.0 .AND. MSDEV(I)
     * .EQ. 0.0) GO TO 600
      WRITE (6,61) INTBND(I),MCOM(I),
     * MAG(I),MWGT(I),MSDEV(I)
```

```
   61 FORMAT (3X,I3,A1,6X,F4.2,7X,F4.1,6X,F4.1)                          S19P1510
  600 CONTINUE                                                           S19P1520
C                                                                        S19P1530
C..   END OF STAR                                                        S19P1540
C                                                                        S19P1550
      WRITE (6,62) NAME1,NAME2                                           S19P1560
   62 FORMAT (///1X,10A1,3X,' *** END OF DATA FOR STAR *** ',3X,10A1)    S19P1570
      GO TO 100                                                          S19P1580
C                                                                        S19P1590
C..   EXIT FROM PROGRAM                                                  S19P1600
C                                                                        S19P1610
  999 STOP                                                               S19P1620
      END                                                                S19P1630
```

HD 358 *** BEGINNING OF DATA FOR STAR *** AIT AND

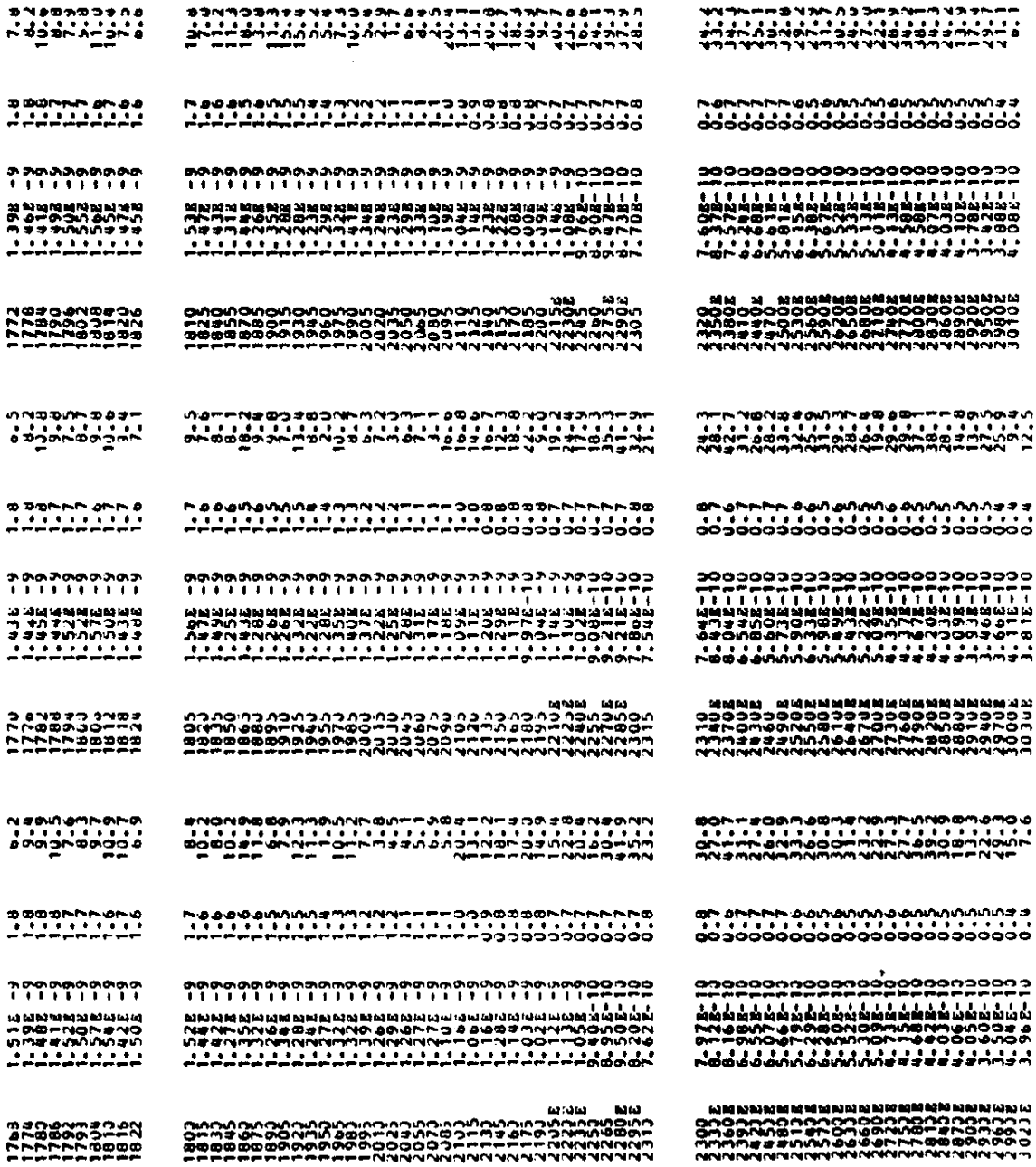
PLATE	EXP TIME	X(MM)	Y(MM)	SCANS	WEIGHT	SCALE
SL4- 67	217	-10.5	-0.7	23	0.7	0.95
SL4- 68	72	-10.5	-0.7	19	0.7	1.10
SL4- 69	28	-10.5	-0.7	19	0.8	0.97

FLUX ADJUSTMENT FACTOR = 1.23+-

LAMBDA	FLUX	WEIGHT	ST-DEV	LAMBDA	FLUX	WEIGHT	ST-DEV	LAMBDA	FLUX	WEIGHT	ST-DEV
1360	1.52E -9	0.4	6.3	1362	2.02E -9	0.4	6.5	1364	2.27E -9	0.5	0.3
1366	2.13E -9	0.5	20.9	1368	1.97E -9	0.6	8.4	1370	2.15E -9	0.9	0.9
1372	2.16E -9	0.6	4.3	1374	1.96E -9	0.6	19.4	1376	1.77E -9	0.7	1.2
1378	2.34E -9	0.9	4.7	1380	2.45E -9	0.9	14.4	1382	2.24E -9	0.9	17.0
1384	2.18E -9	0.9	20.7	1386	1.91E -9	0.9	23.6	1388	2.11E -9	1.0	24.4
1390	2.21E -9	1.0	20.0	1392	1.93E -9	1.0	20.3	1394	1.90E -9	1.0	4.9
1396	1.76E -9	1.0	14.4	1398	1.86E -9	1.0	23.4	1400	1.74E -9	1.0	19.9
1402	1.94E -9	0.9	1.8	1404	1.61E -9	0.9	8.3	1406	1.46E -9	0.9	8.2
1408	1.44E -9	0.9	1.2	1410	1.34E -9	0.8	24.9	1412	1.36E -9	0.9	15.5
1414	1.72E -9	1.0	11.9	1416	2.05E -9	1.1	10.6	1418	2.09E -9	1.1	6.6
1420	2.26E -9	1.1	0.2	1422	1.94E -9	1.1	1.2	1424	2.26E -9	1.1	1.3
1425	2.27E -9	1.2	5.3	1426	2.12E -9	1.2	3.8	1430	2.06E -9	1.2	7.9
1432	1.92E -9	1.2	2.7	1434	2.03E -9	1.2	3.4	1436	2.30E -9	1.2	2.1
1438	2.35E -9	1.2	3.2	1440	2.07E -9	1.2	9.1	1442	2.21E -9	1.2	0.3
1444	2.21E -9	1.2	1.3	1446	2.18E -9	1.3	7.7	1448	2.20E -9	1.3	2.7
1450	2.17E -9	1.3	2.7	1452	2.13E -9	1.4	5.6	1454	2.41E -9	1.4	3.8
1456	2.25E -9	1.4	10.5	1458	2.24E -9	1.4	5.9	1460	2.21E -9	1.4	7.3
1462	2.08E -9	1.4	5.9	1464	2.11E -9	1.5	8.2	1466	2.06E -9	1.5	8.2
1468	1.98E -9	1.5	10.4	1470	1.94E -9	1.5	10.4	1472	2.11E -9	1.4	13.3
1474	2.05E -9	1.4	12.9	1476	2.08E -9	1.4	12.1	1478	2.01E -9	1.5	12.8
1480	1.85E -9	1.5	10.2	1482	1.85E -9	1.6	14.6	1484	2.02E -9	1.6	14.6
1485	2.00E -9	1.6	13.0	1488	2.19E -9	1.5	17.8	1490	2.07E -9	1.5	17.2
1492	2.08E -9	1.4	19.2	1494	2.09E -9	1.5	20.6	1496	2.01E -9	1.5	16.8
1498	1.94E -9	1.6	19.1	1500	2.03E -9	1.8	15.3	1502	2.06E -9	1.9	10.2
1504	2.00E -9	1.9	6.8	1506	2.07E -9	1.9	10.0	1508	1.95E -9	1.8	5.9
1510	1.89E -9	1.7	14.7	1512	1.94E -9	1.7	23.2	1514	2.04E -9	1.7	19.8
1516	1.97E -9	1.8	11.8	1518	1.95E -9	1.9	8.3	1520	1.97E -9	1.9	7.7
1522	1.88E -9	1.8	19.0	1524	1.80E -9	1.8	15.1	1526	1.79E -9	1.8	11.8
1528	1.61E -9	1.8	12.4	1530	1.56E -9	1.7	16.4	1532	1.58E -9	1.7	17.8
1534	1.66E -9	1.7	18.4	1536	1.77E -9	1.8	18.0	1538	1.72E -9	1.8	15.5
1540	1.78E -9	1.8	8.4	1542	2.03E -9	1.8	5.4	1544	2.04E -9	1.8	3.2
1546	2.00E -9	1.8	2.3	1548	1.98E -9	1.8	13.0	1550	1.99E -9	1.8	14.5
1552	2.04E -9	1.8	7.9	1554	2.08E -9	1.7	9.8	1556	2.03E -9	1.7	13.5
1558	1.92E -9	1.7	14.0	1560	1.90E -9	1.7	8.8	1562	2.06E -9	1.8	12.8
1564	2.08E -9	1.8	11.2	1566	2.01E -9	1.8	9.8	1568	2.04E -9	1.8	11.1
1570	2.02E -9	1.8	13.6	1572	2.00E -9	1.8	16.5	1574	2.01E -9	1.9	9.7
1576	2.02E -9	1.9	5.8	1578	2.07E -9	2.0	1.0	1580	2.11E -9	2.0	2.7
1582	2.14E -9	1.9	2.7	1584	2.19E -9	1.9	9.3	1586	2.27E -9	1.9	8.9
1588	2.27E -9	1.9	8.3	1590	2.18E -9	1.9	9.0	1592	2.23E -9	1.9	8.6
1594	2.30E -9	1.9	7.1	1596	2.27E -9	1.9	6.6	1598	2.22E -9	1.9	10.6
1600	2.13E -9	1.9	11.4	1602	2.05E -9	1.9	7.6	1604	2.12E -9	1.9	4.9
1606	2.09E -9	1.9	4.2	1608	1.96E -9	1.9	6.4	1610	1.96E -9	1.9	5.4
1612	2.05E -9	1.9	6.2	1614	2.16E -9	1.9	5.4	1616	2.14E -9	1.9	7.8
1618	2.11E -9	1.9	4.8	1620	2.13E -9	1.9	2.1	1622	2.20E -9	1.9	3.6
1624	2.26E -9	1.9	8.1	1626	2.18E -9	1.9	7.0	1628	2.10E -9	1.9	1.9
1630	2.10E -9	1.9	4.6	1632	2.06E -9	1.9	5.3	1634	2.02E -9	1.9	3.6
1636	1.98E -9	1.9	2.4	1638	1.97E -9	1.9	4.5	1640	1.98E -9	1.9	7.1
1642	1.99E -9	1.9	4.5	1644	2.10E -9	1.9	6.1	1646	2.17E -9	1.9	8.0
1648	2.17E -9	1.9	8.9	1650	2.09E -9	1.9	9.2	1652	2.00E -9	1.9	8.0
1654	2.00E -9	1.9	7.8	1656	2.04E -9	1.9	8.9	1658	2.04E -9	1.9	2.0
1660	2.08E -9	1.9	4.7	1662	2.19E -9	1.9	10.0	1664	2.22E -9	1.9	13.1
1666	2.16E -9	1.9	13.0	1668	2.14E -9	1.8	8.6	1670	2.21E -9	1.8	8.8
1672	2.29E -9	1.8	13.1	1674	2.29E -9	1.8	13.4	1676	2.28E -9	1.8	13.3
1678	2.36E -9	1.8	12.0	1680	2.34E -9	1.8	7.2	1682	2.23E -9	1.9	6.6
1684	2.16E -9	1.9	6.2	1686	2.15E -9	1.9	3.3	1688	2.13E -9	1.9	3.3
1690	2.06E -9	1.9	6.9	1692	1.97E -9	1.9	8.1	1694	1.96E -9	1.9	4.3
1695	2.04E -9	1.8	1.0	1698	2.12E -9	1.8	0.8	1700	2.07E -9	1.8	1.9
1702	1.99E -9	1.8	1.0	1704	1.96E -9	1.8	3.4	1706	1.90E -9	1.9	3.3
1703	1.85E -9	1.9	5.6	1710	1.85E -9	1.9	8.3	1712	1.83E -9	1.9	4.8
1714	1.80E -9	1.8	5.2	1716	1.80E -9	1.8	7.2	1718	1.79E -9	1.8	8.4
1720	1.79E -9	1.8	8.1	1722	1.73E -9	1.9	8.6	1724	1.80E -9	1.9	6.0
1726	1.67E -9	1.9	5.1	1728	1.72E -9	1.9	4.5	1730	1.73E -9	1.8	5.2
1732	1.74E -9	1.8	6.5	1734	1.74E -9	1.8	5.0	1736	1.72E -9	1.8	2.7
1738	1.69E -9	1.8	1.6	1740	1.69E -9	1.8	6.0	1742	1.75E -9	1.8	8.4
1744	1.82E -9	1.7	5.8	1746	1.86E -9	1.7	8.6	1748	1.85E -9	1.7	11.5
1750	1.81E -9	1.7	12.0	1752	1.79E -9	1.7	10.2	1754	1.76E -9	1.7	8.4
1756	1.68E -9	1.7	8.3	1758	1.60E -9	1.7	10.2	1760	1.56E -9	1.8	11.5
1762	1.57E -9	1.8	9.2	1764	1.57E -9	1.8	8.0	1766	1.56E -9	1.8	6.5

Output of Sample Program (1 of 3)

Output of Sample Program (2 of 3)



3280E	3.02E-10	0.4	19.5	3260E	3.13E-10	0.4	19.5	3240E	3.12E-10	0.4	21.2
3300E	2.95E-10	0.4	24.3	3320E	3.07E-10	0.4	20.4	3340E	2.96E-10	0.4	26.1
3360E	3.07E-10	0.3	22.3	3380E	3.11E-10	0.3	16.5	3400E	3.05E-10	0.3	12.0
3420E	2.90E-10	0.3	9.9	3440E	2.74E-10	0.4	8.9	3460E	2.57E-10	0.4	6.9
3480E	2.50E-10	0.4	9.3	3500E	2.52E-10	0.4	9.7	3520E	2.62E-10	0.4	11.9
3540E	2.82E-10	0.3	13.8	3560E	3.08E-10	0.3	11.8	3580E	3.26E-10	0.3	6.7
3600E	3.16E-10	0.3	2.4	3620E	2.89E-10	0.3	4.2	3640E	2.61E-10	0.3	8.0
3660E	2.47E-10	0.3	11.4	3680E	2.45E-10	0.3	11.6	3700E	2.56E-10	0.3	8.7
3720E	2.65E-10	0.3	5.9	3740E	2.69E-10	0.3	16.1	3760E	2.66E-10	0.3	25.5
3780E	2.61E-10	0.3	32.3	3800E	2.57E-10	0.3	35.9	3820E	2.52E-10	0.4	37.9
3840E	2.51E-10	0.4	39.0	3860E	2.53E-10	0.4	39.2	3880E	2.58E-10	0.4	38.3
3900E	2.68E-10	0.3	35.6	3920E	2.77E-10	0.3	32.2	3940E	2.87E-10	0.3	28.1
3960E	2.96E-10	0.3	24.6	3980E	3.03E-10	0.3	21.5	4000E	3.09E-10	0.3	19.3
4020E	3.13E-10	0.3	18.3	4040E	3.15E-10	0.3	17.4	4060E	3.15E-10	0.3	16.9
4080E	3.16E-10	0.4	16.1	4100E	3.19E-10	0.4	15.1	4120E	3.24E-10	0.4	13.7
4140E	3.30E-10	0.4	11.9	4160E	3.38E-10	0.4	11.0	4180E	3.47E-10	0.4	10.4

LAMBDA	MAGNITUDE	WEIGHT	ST-DEV
139	0.71	1.0	15.0
148	0.63	1.5	22.5
154	0.73	1.8	11.7
159	0.58	1.9	4.2
166	0.58	1.9	5.7
172	0.76	1.8	3.4
181	0.99	1.7	8.0
192	1.12	1.5	9.5
204	1.15	1.1	37.3
213	1.33	0.8	20.6
245E	1.85	0.6	33.9
280E	2.33	0.5	28.1
350E	2.78	0.3	17.4

HD 358 *** END OF DATA FOR STAR *** ALF AND

Output of Sample Program (3 of 3)

```
TAPESCAN 4.3  -  GSFC TAPE ANALYSIS AND COPYING PROGRAM     05/29/85    11:40:13.0    INPUT VOL=WHW005    (LAST MOD-07/25/84)    PAGE    1
OPTIONS IN EFFECT: LIST=004

HD     358 ALF AND    SL4- 67 217  -10.5    -.7 23   .7   .95 SL4- 68   72  -10.5    -.7 19   .7 1.10 SL4- 69   28  -10.5    -.7 19   .8   .97
CC4444FFF4CDC4CDC444EDF64FF4FFF446FF4F44464F4FF444F444FF4EDF64FF44FF446FF4F44464F4FF444F4F4FF4EDF64FF44FF446FF4F44464F4FF444F444FF44
840000358013601540002340067021700010B50000B702300B700B95023400680072000 10B50000B701900B701B1002340069002800010B50000B701900B800B9700

HD    2054 HR 96      SL3-128 225:    2.0  -8.7 17   .9 1.00
CC444FFFF4CD4FF44444EDF6FFF4FFF7444F4F446F4F4FF444F4F4FF44444444444444444444444444444444444444444444444444444444444444444444444444444444444444444444
840002054089096000002330128022 5A0002B00008B701700B901B00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000

HD    4142 HR 189     SL3-129 225: -14.3    2.2 21 1.0 1.00
CC444FFFF4CD4FFF4444EDF6FFF4FFF746FF4F444F4F4FF4F4F4F4FF44444444444444444444444444444444444444444444444444444444444444444444444444444444444444444444
840004142089018900002330129022 5A0014B30002B202101B001B00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000

HD   10516 PHI PER    SL3-187 231  -17.2    7.4 13   .9 1.00
CC44FFFFF4DCC4DCD444EDF6FFF4FFF446FF4F444F4F4FF444F4F4FF44444444444444444444444444444444444444444444444444444444444444444444444444444444444444444444
840010516078907590002330187023100017B20007B401300B901B00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000

TAPEMARK NO 0001                    BLOCK LENGTHS:  MIN=21416  MAX=26770  AVG=26716    NUMBER OF BLOCKS=000099

SL2-001                CAL.  730515                 005                          FLIGHT                    SL2-002  10:30 -61.4    341  7306
EDF6FFF4444444444444444CCD444FFFFFF444444444444444444FFF444444444444444444444444CDCCCE4444444444444444EDF6FFF44FF7FF46FF4F444FFF44FFFF
232000100000000000000313B007305150000000000000000000050000000000000000000000000639783000000000000000000232000200 10A300061B4000341007306

SL3-273                CAL.  730625                 003                          FLIGHT                    SL3-274                CAL.  7306
EDF6FFF4444444444444444CCD444FFFFFF444444444444444444FFF444444444444444444444444CDCCCE4444444444444444EDF6FFF4444444444444444CCD444FFFF
233027300000000000000313B007306250000000000000000000030000000000000000000000000639783000000000000000000233027400000000000000313B007306

TAPEMARK NO 0002                    BLOCK LENGTHS:  MIN=14900  MAX=32000  AVG=23450    NUMBER OF BLOCKS=000002

TAPEMARK NO 0003 -- EOV NO 001

TRUE DENSITY AT END OF PROCESSING:  DEN=3

LENGTH ESTIMATE=0146 FEET 07 INCHES FOR DEN=3 AND TRTCH=STANDARD

(LENGTH ESTIMATE USUALLY ACCURATE WITHIN PLUS OR MINUS TEN PERCENT;  ALMOST ALWAYS WITHIN TWENTY PERCENT)

PROCESSING OF THIS TAPE COMPLETED:    TOTAL BYTES READ=0002691776    NUMBER OF DATA BLOCKS READ=000101
```

Skylab
Skylab S-019 AAE-UV
Data (1979)
D-66134

```
$NOP
$NOP
$NOP
$NOP
$NOP ********* LIST OF 1ST & LAST RECORD ON SO-1 *************
$EXE TPLIST BS

INPUT PARAMETERS ARE:  AS FL=1=1 1

 TAPE NO.   1              FILE NO.   1
 RECORD   1                LENGTH   26770
HD    358 ALF AND   SL4- 67 217  -10.5   -.7 23  .7  .95 SL4- 68  72  -10.5   -.7 19  .7 1.10 SL4-
69  28  -10.5   -.7 19  .8  .97
        1.23+-

                                                                                U1523 4 63U2023 4 65U2273 5  3U2
133 5209U1973 6 84U2153 6  6 2163 6 43U1963 6194U1773 7 12 2343 9 47 2453 9344 2243 9370 2183 9207
1913 9236 211310244 221310200 193310203 190310 49 176310144 186310234 174310199 1943 9 18 1613 9 83
 1463 9 82 1443 9 12 1343 8249 1363 9155 172310119 205311106 209311 66 226311  2 194311 12 226311 1
3 227312 53 212312 38 206312 79 195312 27 203312 34 230312 21 235312 32 207312 61 221312  3 221312
13 218313 77 220313 27 217313 27 213314 56 241314 58 225314105 224314 59 221314 73 208314 59 211315
 82 206315 82 198315104 194315104 211314133 205314129 208314121 201315128 185315102 185316146 20231
6106 200316130 219315178 207315172 208314192 209315206 201315188 194316191 203318153 206319102 2003
19 68 207319100 195318 99 189317147 194317232 204317168 197318118 195319 83 197319 77 188318196 180
318151 179318118 161318124 156317164 158317176 166317184 177318180 172318155 178318 84 203318 54 20
4318 32 200318 23 198318130 199318145 204318 79 208317 98 203317135 192317140 198317 88 206318126 2
08318112 201318 98 204318111 202318136 200318165 201319 97 202319 58 207320 10 211320 27 214319 27
219319 93 227319 89 227319 83 218319 90 223319 86 230319 71 227319 66 222319106 213319114 205319 76
 212319 49 209319 42 196319 64 196319 54 205319 62 216319 54 214319 78 211319 48 213319 51 220319 3
6 226319 81 218319 70 210319 19 210319 46 206319 53 202319 36 198319 24 197319 45 196319 71 199319
45 210319 61 217319 80 217319 89 209319 92 200319 86 200319 78 204319 49 204319 20 208319 47 219319
100 222319131 216319130 214318 86 221318 88 229318131 229318134 228318133 236318120 234318 72 22331
9 66 216319 62 215319 33 213319 33 206319 69 197319 81 196319 23 204318 30 212318  8 207318 19 1993
18 10 196318 34 190319 33 185319 56 185319 83 183319 48 180318 52 180318 72 179318 64 179318 81 173
319 86 166319 66 167319 51 172319 45 173318 52 174318 65 174318 56 172318 27 169318 16 169318 60 17
5318 64 182317 58 186317 86 185317115 181317120 179317102 176317 84 168317 83 160317102 156318115 1
57318 92 157318 80 156318 65 151318 62 143318 65 139318 78 139318 94 142318 82 146318 82 148318 99
145318108 141318106 141318105 144317 98 149317 88 152317 76 152317 75 150317 79 150317 83 152317 87
 155317 98 157317 97 157316 98 156316110 154316109 150317106 145317104 142317107 143317 94 147316 7
5 150316 69 148316 71 145316 66            152317 84 156317 95 153317108 144316102 147316 76 147316
70 142316 80 149316 81 143316112 127316102 125316 81 131316113 135316149 143315182 144315180 132316
118 128316 94 126316 38 126315 68 126315 98 135315113 134315 79 126315 70 128315154 128315123 13231
5134 128315154 124315113 122314 88 123314 52 127314 19 128314 20 129314 54 132313105 135313102 1323
13 73 132313112 140313 87 141312100 139312 77 137312 63 134312 54 126312 38 122312 72 124312 29 129
312 45 125312 30 123311 17 126311 41 128311 63 129311 66 127311 51 131311 71 133311 84 127311 69 11
7311 31 110311 25 110311 58 118311166 119310204 116310204 109310168 104310131 106310131 111310146 1
143 9131 1163 9122 1203 8167 1233 8208 1283 8181 1293 8123 1223 8127 1143 8174 1113 8188 1083 8183
1033 8200 9974 8222 1003 8209 1023 8149 1043 8 90 1093 7 97E1123 7154E1143 7192E1143 7207E1133 7228
E1103 7244E1083 7236E1053 7204E1023 7179 9764 7166 9404 7162 9084 7183 8904 7241 8954 7304E9214 735
3E9474 7393E9504 7419E9214 7411E8734 7379E8204 7352 7864 8329 7704 8285 7624 8232 7544 8211
   7974 8308 7644 8243 7604 7242E8124 7270E8434 7281E8374 6332E8164 6417E8044 6427E7574 7343E6984 7
311E6544 7312 6244 7277E6554 7274E6854 7268E6684 7251E6074 7260 5604 7282 5614 7301E5664 7329E5734
7338E5814 7328E5794 6333E5904 6324E6154 6292E6294 6266E6334 6259E6384 5279E6284 5308E5984 5315E5674
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